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SUGARCANE RESEARCH IN FLORIDA, GEORGIA AND LOUISIANA

A report of the visit of the Station Agronomist to some of the field stations maintained by the Division of Sugar Plant Investigations of the United States Department of Agriculture.

By Robert L. Davis, Agronomist.

INTRODUCTION

The Division of Sugar Plant Investigations of the United States Department of Agriculture maintains field stations for the breeding and testing of sugarcane seedlings at Canal Point, Florida; Houma, Louisiana; and Cairo, Georgia. The University of Louisiana at Baton Rouge also makes yield tests of new cane varieties in Louisiana. Various topics of possible interest to Puerto Rican sugar planters have been noted and are described briefly in the following notes.

THE SUGARCANE BREEDING STATION AT CANAL POINT, FLORIDA

The work of cane breeding at Canal Point, Florida, is in charge of Dr. G. B. Sartoris, Pathologist, and that of testing in charge of Mr. R. T. Gibbens, Agronomist. When the season is favorable for arrow formation and germination, approximately 10,000 seedlings are bred each year. Difficulty is experienced, however, in getting many varieties to flower in Florida. In Puerto Rico, on the contrary, nearly all varieties will flower freely if planted in certain humid uplands at a proper elevation.

Seed cuttings of the best first-year seedlings, usually about 1,000 in number, are divided into three duplicate lots and set aside for testing in three widely separated localities with contrasting climatic conditions, Canal Point, Florida; Houma, Louisiana; and Cairo, Georgia. The contrasting behavior of certain Mayaguez seedlings in different parts of Puerto Rico indicates the desirability of this practice.

In order to choose the best parent varieties for more extensive breeding, many combinations are tested at Canal Point in small lots of about 100 each. Seedlings of Coimbatore 281 crossed with P.O.J. 2878 are at present considered very desirable and the combination is now being emphasized. Sugarcane varieties of a comparatively thin type, such as Coimbatore 281 and Canal Point 807, have done better in Louisiana than P.O.J. 2725 and other thick-caned types; this fact is a primary consideration at Canal Point where primary objectives are early ripening and resistance to disease and where cane girth is of secondary importance.

Many introduced varieties are under trial at Canal Point. Amongst those from Puerto Rico are Fajardo Central 916, Puerto Rico 803, and the Mayaguez varieties Nos. 3, 7, 28, 42, 49, 61, 63 and 151. Most of these Mayaguez seedlings have been selected for early ripening and resistance to mosaic and leaf spot and for this reason they may prove of value in Florida where these qualities are highly desirable.

THE COOPERATIVE ORGANIZATION OF THE FIELD STATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE AT HOUMA, LOUISIANA

The Field Station of the United States Department of Agriculture at Houma, Louisiana, appears to a visitor as outstanding for the esprit de corps of the staff and the comprehensive nature of the research conducted by four different bureaus of the United States Department of Agriculture, namely, the Bureau of Plant Industry, Bureau of Chemistry and Soils, Bureau of Entomology, and Bureau of Agricultural Engineering.

The staff includes two plant pathologists studying disease resistance, three agronomists testing for better cultural methods and higher-yielding varieties, an agricultural engineer working on drainage control, and three or four chemists studying soil fertility and methods of fabrication.

The various staff members cooperate fully by helping solve each other's problems. For example: When the agronomists needed to determine more accurately the probable milling yield of the more promising varieties of sugarcane, the equipment of the Bureau of Chemistry and Soils and the help of the chemists was made available and a method was devised whereby marked difference in some varieties was determined.

METHODS USED IN TESTING FOR DISEASE RESISTANCE AT HOUMA, LOUISIANA

The major sugarcane diseases in Louisiana are red rot, root rot and mosaic. P.O.J. 213, which was one of the more promising of the introduced sugarcane varieties and was at one time cultivated on thousands of acres in Louisiana, has been practically eliminated from cultivation by the red-rot disease. The mosaic disease and various root-rot organisms are held to be responsible for the large-scale losses to the Louisiana sugar industry that occurred when Louisiana Purple and other commonly grown varieties were practically wiped out and only the introduction of resistant Java varieties prevented utter ruin.

Under the direction of Dr. R. D. Rands, Senior Pathologist, with headquarters in Washington, D.C., the effect of each of these diseases on the yield of sugarcane varieties is studied. Plantings are made in replicated series similar to those used in preliminary field trials conducted by agronomists. Small plots of cane presumably inoculated with a disease are compared with adjacent plots of healthy cane. The effort is made to determine which are the more resistant seedlings or varieties and, by studying the seedling progenies of the more promising varieties, to determine which ones transmit resistance to its seedlings and are therefore of greatest value as parents. Valuable data showing the injurious effect of each disease on the principal cane varieties is secured in this way. The disease resistance trials with red rot are conducted by Dr. F. V. Abbott, and those with mosaic by Mr. E. M. Summers.

The method used in transmitting the mosaic disease,^{1/} by means of which hundreds of second-year seedlings are tested for resistance to the disease, is a marked improvement over other artificial methods. Juice is extracted by means of a meat grinder from cane tops infected with the mosaic disease and squirted with a medicine dropper into the upper leaf whorls of healthy young cane plants. A No. 2 sewing needle, thrust rapidly a number of times through the cane plants at these places, carries some of the juice containing the disease organisms into the leaves. This method may prove of value in Puerto Rico as it is very effective; in the case of a susceptible variety, a large proportion of the cane plants takes the disease.

METHODS AND EQUIPMENT USED IN TESTING FOR SUGAR YIELD AT HOUMA, LOUISIANA

The yield tests conducted by the Division of Sugar Plant Investigations at Houma and other points in Louisiana are in charge of Dr. George Arceneaux, Agronomist. Each variety or seedling received from Canal Point is grown at Houma during the second year in a single eight-foot row. At maturity sight comparisons are made, as to stooling habit and apparent cane production, with the three best commercial varieties, C.P. 807, P.O.J. 234, and Coimbatore 281, which are grown alternately in every third row. The seedling varieties are compared with C.P. 807 as to stooling. All seedlings, usually about as many as 1,000, are analyzed, using eight stalk samples, and comparisons are made with P.O.J. 234 as to early ripening, and with Coimbatore 281 as to sucrose content in mid-season. The aim is to analyze early enough to avoid the freeze risk of losing all the top seed and having no planting material for third-year trials.

The best 100 seedlings in the second-year single-row trials are increased the following year in even-sized three-row blocks about 1/100 acre in area. Depending on the seed available, from one to four blocks are planted to each seedling. About every fifth block is planted to a standard variety. Plant cane and stubble yield tests are run on these. Weights are taken and from two to four analyses are run on each seedling. The size of samples runs from 40 to 50 canes. The analyses are run as nearly as possible at the same time, during about the middle of the grinding season.

During the fifth year the aim is to increase the seed supply of the very best seedlings and at the same time give them a preliminary field trial. The 10 best seedlings chosen the preceding year are grown in 1/150 to 1/200 acre plots replicated about 7 times. From amongst these the 3 or 4 that appear to be the very best are also tested in the same way on various plantations. Analyses are made from 40 cane samples from each plot, the whole canes being taken at random behind the cutter.

From the fifth-year seedlings the best one or two are chosen for variety trials on representative soil types. Six varieties, including the two new seedlings, are grown in 1/40 acre plots and each variety is replicated 11 times. Sugar yields are, as in the preliminary trials, estimated from analyses of 40 canes per plot.

^{1/} MATZ, JULIUS

1933. Artificial transmission of sugarcane mosaic.
Jour. Agri. Research 46 - 9:821-839.

Equipment for grinding. - Two small power mills are used for grinding the samples. One is adjusted to secure a juice extraction of 60 per cent and the other to secure a higher extraction corresponding to that secured in the local centrals. Reduction factors are determined for each variety included in the final agronomic trials so that the normal per cent sucrose and normal per cent purity may be calculated.

Motorized equipment is used for weighing. - Cane harvesting is conducted under considerable pressure in Louisiana with the aim of getting all the cane either cut and ground, or windrowed before a heavy freeze comes. For this reason it is impracticable to depend on the staff or equipment of the sugar mills for weighing and grinding the plots separately. With the object of facilitating the work of weighing the plots in the field, Mr. A. M. O'Neal, of the Bureau of Chemistry and Soils, designed the mounting of a weighing scale on an automobile chassis. It bears a license plate and is run as a trailer behind the truck. After each plot is weighed, samples of the desired size are selected, tied into bundles, and placed in the truck to be hauled to Houma. The rest of the cane is thrown back on the field for general grinding.

SOME VARIETIES GROWN EXTENSIVELY IN LOUISIANA

The variety Canal Point 807, which was bred at Canal Point, thrives on heavy clay soil and appears to stubble better than other commercial varieties. Coimbatore 281 is not as productive as Canal Point 807 but is valued highly for late grinding as experiments conducted by the Division of Sugar Plant Investigations indicate that it withstands freeze injury when windrowed better than any other variety thus far tested. This feature is of paramount importance since a large part of the crop must be windrowed to avoid heavy losses that would occur in the standing cane. The planters are interested in securing a somewhat thicker-girthed cane than those now in use. This would, however, slightly increase the cost of planting as a greater weight of cane would have to be used for seed purposes.

TESTING FOR SYRUP PRODUCTION AT CAIRO, GEORGIA

At Cairo, Georgia, since the aim is increased syrup production, a variety high in glucose is desirable. Agronomic tests similar to those made at Houma, Louisiana, are run here. Equipment for weighing the juice of each variety under trial and for making samples of syrup to determine the flavor and color, both of which qualities, vary according to the variety, is available and complete.

S U M M A R Y

The cane breeding is conducted by the Division of Sugar Plant Investigations of the United States Department of Agriculture at Canal Point, Florida. Four bureaus of the United States Department of Agriculture cooperate to the fullest extent at the Field Station at Houma, Louisiana, endeavoring to secure improved sugarcane varieties and improved methods of culture and fabrication for the sugar industry of Louisiana. The technique for testing seedlings for mosaic resistance at Houma is easy to use and may prove of value in Puerto Rico. In the yield tests conducted in Louisiana, emphasis is made of the use of small plots 1/100 to 1/200 acre in size replicated many times in preliminary trials. This method could be adopted to advantage in preliminary trials in Puerto Rico. The use of a scale for weighing mounted on a truck similar to that devised at Houma would facilitate the handling of small plots.

